

Design of Transparent Switchable Rectangular Microstrip Patch Antenna Using H-Slot For Wireless Applications

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Abstract

A propose and study of an efficient, visible switchable rectangular micro strip square antenna using H-slot for multiple applications. The antenna is working at 2.4GHZ. The burning component and ground plane, both are made of AgHt-4 (Silver Coated Polyester) visible conductive film and substrate is made of FR4(Flame Retardant) transparent glass epoxy material with thickness is 1.5mm, permittivity is 4.4 and loss tangent 0.02. The antenna consists of a ground, substrate and simple rectangular radiating patch these are made of transparent material so it is called transparent antenna. The microstrip feed lines using an edge feed method which is connected in ground plane by the port, H-slot on the patch with highly conductive strip coated on the slot edges using wide silver paste that improves the efficiency of transparent antenna. The antenna uses Schottky diode switches for operating ON and OFF condition to operate the antenna. In the series the diode acts as ON condition and in parallel the diode acts as OFF condition. This H-slot was reduced loss and those conditions for measuring VSWR, Radiation pattern, Gain, Return loss in the simulation result.

Keywords : Transperent Antenna, Digital multimedia broadcasting, patch antenna

INTRODUCTION

The basic structure of the proposed antenna consists of 3 layers. The lower layer, which is the ground plane which made of AgHt-4(Silver Coated Polyester) transparent conductive film with a side of (38.47X47.04) mm. The middle layer which is substrate which made of FR-4(Flame Retardant)transparent glass epoxy material with a side of (38.47X47.04)mm. it has a relative dielectric constant is 4.4 and height is 1.5 mm. The upper layer, which is the radiating patch which made of AgHt-4(Silver Coated Polyester) transparent conductive film with a side of (29.47X38.04)mm. it covers the rectangular top surface. The antenna consist of 3 layers a ground, substrate and simple rectangular radiating patch these are made of transparent material so it is called transparent antenna. The previous researchers have used three main types of transparent conductive Films for designing transparent antennas. As the proposed transparent antenna is manually made by cutting out the patch and the feed from the coated polyester sheet of AgHT-4 these transparent conductive films exhibit sheet resistance of at least 1-2 ohm/square compare another 2 types of material. but Antennas made of such transparent conductor films are not efficient because of the high sheet resistance, which is one of the major obstacles to the widespread application of transparent antennas.

Improving The Efficiency Of Transparent Antenna

The antenna made of the AgHT film exhibits considerable ohmic loss along the slot edges due to the high sheet resistance, and indicates degradation in antenna performance. In this letter, propose a method for improving the efficiency of antennas made from transparent conductive film, by applying highly conductive coating or metallization in the form of a very narrow strip to selective antenna areas. Which provides high current density of AgHT-4 film with metallized narrow strips. To demonstrate the effectiveness of the method, an approximately 1 mm wide highly conductive strip was applied to the slot edges of the transparent antenna configuration. That the surface currents are strong along the edges of the slot and at the feed. The proposed method improves antenna efficiency at the expense of achieving the full optical transparency.

SWITCHING METHOD

A switch is inserted on the patch surface that is slotted to fixed the slot to control its status. The switch can be used schottky diode for the advantages of

- **Low turn on voltage:** The turn on voltage for the diode is between 0.2 and 0.3 volts.
- **Fast recovery time:** The fast recovery time because of the small amount of stored charge means that it can be used for high speed switching applications.
- **Low junction capacitance:** In view of the very small active area, often as a result of using a wire point contact onto the silicon, the capacitance levels are very small.

The diodes are set to four conditions.....they are below

- Series series(11)
- Series parallel(10)
- Parallel series(01)
- Parallel parallel (00)